Small Business Innovation Research/Small Business Tech Transfer

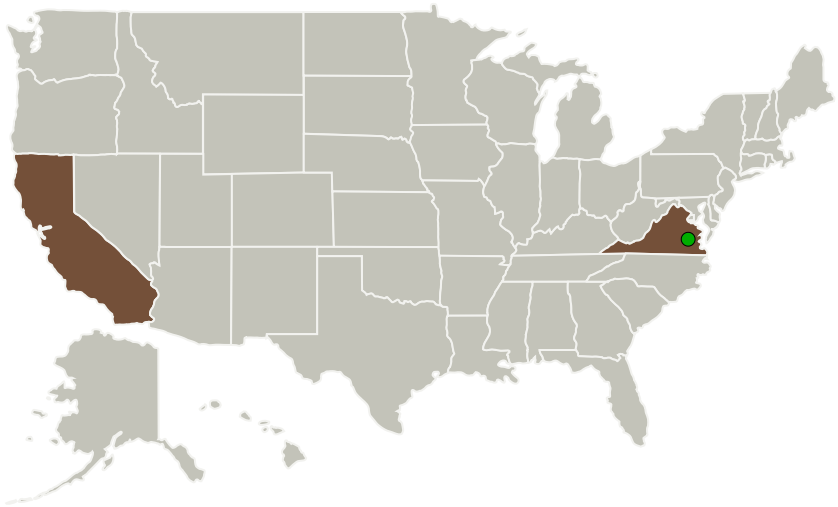
Resilient Affordable Cubesat Processor, Phase I

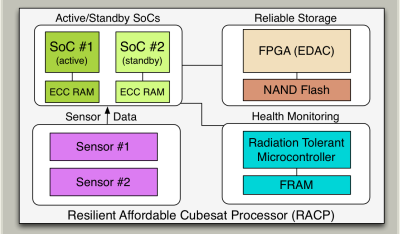
Completed Technology Project (2016 - 2016)

Project Introduction

Advanced Materials Applications, LLC (AMA) proposes the Resilient Affordable Computing Platform (RACP), a power-efficient high-performance space computer design for low-Earth orbit (LEO) missions. RACP?s hybrid design combines the state of the art ARM System on Chip (SoC) processors with a non-radiation-hard-by-design FPGA and a radiation tolerant microcontroller to deliver fault tolerance, data integrity, and scalable performance. RACP?s physical dimensions and low power consumption make it ideal for vehicles as small as CubeSats. RACP includes custom health monitoring software that continuously watches vulnerable components for potential latch-up or degradation due to radiation exposure and takes corrective action as needed. RACP will consume between 0.53 to 8.7 Watts of peak power depending on clock speed and workload. At the high end, its compute performance will exceed 25,000 Dhrystone Millions of Instructions Per Second (MIPS), 2,100 Whetstone Millions of Floating Point Operations Per Second (MFLOPS) and 9,200 Whetstone Millions of Fixed Point Operations Per Second (MOPS). RACP will support multiple sensor platforms with the primary application of data processing. The processors will use a Linux operating system, which means that mission software can be built and tested with standard open source software tools. Finally, components of RACP will be screened through radiation testing to ensure that the computer will operate reliably for a remote sensing low-Earth orbit (LEO) mission.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Advanced Materials Applications	Lead Organization	Industry Women-Owned Small Business (WOSB)	Groveland, California
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

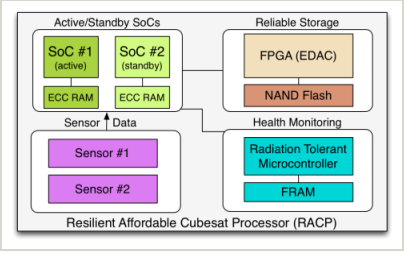
June 2016: Project Start

December 2016: Closed out

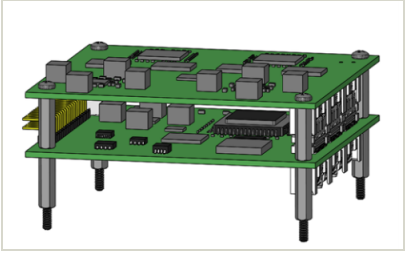
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139883)*

Images



Briefing Chart Image
Resilient Affordable Cubesat Processor, Phase I
(https://techport.nasa.gov/image/126589)



Final Summary Chart Image
Resilient Affordable Cubesat Processor, Phase I Project Image
(https://techport.nasa.gov/image/132349)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Advanced Materials Applications

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

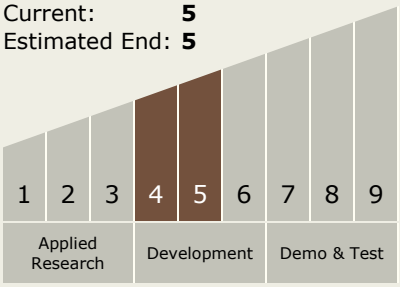
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Kathleen Morse

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



Resilient Afforable Cubesat Processor, Phase I

Completed Technology Project (2016 - 2016)

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.2 Avionics Systems and Subsystems
    - TX02.2.5 High Speed Onboard Interconnects and Networks

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System